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Postmodernism in Geomorphological Research and Approach

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Abstract: *Almost every discipline experienced postmodernism movement in the wake of development of modern thought. Undoubtedly, postmodernism is a phenomenon that belongs to the disciplines of philosophy, arts and social sciences, including human geography. However, it is not difficult to find its parallel in physical geography, especially in geomorphology. It could be discerned in both geomorphic research and approach. It happened after 1950s when doubts were raised about the grand hypothesis of 'cycle of erosion'. This could also be taken as an example of deconstruction in geomorphology. Hence, post 1950s period can be considered as the postmodern phase in geomorphology marked by openness to different opinions on various research problems in geomorphology.*

Introduction

Though postmodernism has been exclusively applied to development of thought in the disciplines of philosophy, arts and social sciences, including human geography (Gregory, 1989; Dikshit, 2001), it is possible to find a similar perspective in physical geography, especially in geomorphology. Ley (1994) considered 'scepticism towards grand claims and theories' as one of the essential features of post-modernism, and such a movement occurred in geomorphology after 1950s when scepticism was shown towards efficacy of the 'cyclic model of evolution of landforms' of Davis (1899, 1932). The 'cycle of erosion' lost the status it enjoyed for half a century because a number of models were proposed setting the new direction to research and approach in geomorphology. Adoption of 'systems analysis' in physical geography and geomorphology changed the approach of looking at geomorphic forms and processes as a part of a complex system, where each component is in a state of dynamic equilibrium with the other components and also with the system as a whole. In fact, other recent trends (the post 1950s developments) like quantitative analysis, applied geomorphology, process studies, climatic geomorphology, etc. can also be considered as results of post-modernism movement in geomorphology.

Post-modernism in geomorphic research

Analogous to openness to a range of opinions in social enquiry, there have been challenges to many of the then existing (pre 1950s) geomorphic hypotheses, models, theories and

concepts dealing with the origin and evolution of landforms and the geomorphic processes sculpturing them. Deconstruction was evident in case of the Davisian 'cyclic model' of landform evolution. In the view of Hart (1986) the overwhelming influence of this model on the minds of geomorphologists for nearly half a century retarded the growth of geomorphology. He says that in recent years both the erosion cycle and denudation chronology have been criticised, and the historical approach in general has fallen into disfavour. In view of this, the near-rejection of 'cyclic evolution of landforms' and interrelated concept of 'denudation chronology' can be cited as examples of scepticism and deconstruction (the two basic features of postmodernism) in geomorphology. To replace it, new models of evolution of landforms were suggested, which include 'dynamic equilibrium' of Hack (1960, 1975), 'tectono-geomorphic model' of Morisawa (1975), and 'episodic erosion model' of Schumm (1975). Nevsky (2013), on the basis of review of thematic structure of publications in geomorphology for the last two decades, believes that the arrival of postmodernism in geomorphology may be identified with the decreased importance in 'historical aspect', focus on 'quantitative estimates of some exogenous geomorphic processes' and a tendency to monitor principal trends in depletion of the earth surface. At the same time, he advocates return to 'historicity and evolutionism' to maintain independent identity of geomorphology.

Some developments in geomorphology during the 1940s and 1950s were instrumental in initiating the postmodern way of thinking in geomorphology. These developments are related with emergence of the quantitative methods in the study of form and process and emphasis on process studies, which led to dissatisfaction with the Davisian model of landscape evolution. It also changed the geomorphic approach from descriptive to analytical. At the same time, an increasing thrust was placed on applied geomorphology. Similarly, development of applied geomorphology (Hails, 1977), climatic geomorphology (Büdel, 1982), environmental geomorphology (Coates, 1972; Cooke and Doornkamp, 1974), quantitative geomorphology, etc. can also be attributed to postmodernism phenomenon in geomorphology. Availability of new tools like remotely sensed data, dating methods, computers and GIS; scientific instruments etc. facilitated the geomorphological research, both in the field and laboratory. All these developments opened new horizons in geomorphology leading to a detailed and precise investigation of landforms and processes, and the dynamic relationship between them.

Among the recent trends in geomorphology (post 1950s), the development of regional geomorphology with emphasis on dividing the continents and oceans into areas of distinct geomorphic features are similar to the postmodern thought that provides a theoretical context to the study of spatial diversity in the real world, and it is closely related with the rise of a 'new' regional geography. In the postmodern geomorphic thought, diversity in geomorphic form and process is seen in context of physical environment as a whole, and many a times the latter is governed by the former. However, one of the features of postmodernism is pronouncedly anti-spatial, and as such it is not applicable *per se* to either geography or geomorphology, since the spatial context is basic to both and the search for spatial pattern and laws is fundamental to geography and geomorphology both. It would be worthwhile to mention here that the postmodernism phenomenon in geomorphology began almost two decades earlier than geography, as it was experienced in post 1950s and 1970s, respectively.

As in postmodernism, instead of universal theory, emphasis now is on, what Dear (1986) called "the contemporaneity of social process over time and space", and like geography, geomorphology is also engrossed in time-space reconstruction of the physical landscape. The time here does not mean the time-dependent model of landscape evolution, instead it is meant for the geochronological reconstruction of landforms and processes, particularly of the Quaternary period. In this context, scientific dating methods, both relative and absolute, have become an integral part of geomorphic research and explanation. It is meaningless to talk about geomorphic change without assigning any date to it. Reconstruction of palaeoclimate and the type and extent of related geomorphic processes are based on the study of stratigraphy , which requires dating of the materials to put them in chronological order. Dating of landforms and materials has become almost indispensable to geomorphic research, not only to understand the sequence and order of landscape evolution but to reveal the extent of operation or prevalence of a process and its role in sculpturing the diverse geomorphic forms on the surface of the earth. The process-form relationship with all its nuances is a must to geomorphic explanation, but without assigning any dogmatic interpretation to it. Quantitative analysis has also become an indispensable part of any geomorphic research in recent times.

Post-modernism in geomorphic approach

Postmodernism can also be seen in geomorphic approach, i.e., how to look at or study the landforms and processes, and relationship between them. There have been significant changes in geomorphic approach in the post 1950s. For example, the time dependent 'historical approach' and organismic perspective while classifying landforms have been replaced by time-independent realistic approaches. Most importantly, postmodern phase has witnessed a paradigm shift. Now geomorphic explanation and analysis is done with the help of systems analysis, models, environmental perspective, hazard perspective, threshold and equilibrium concepts and many such approaches that have transformed the way landform-processes relationship was observed, interpreted and analysed before. Site-specific analysis is given preference over generalisation. Now there is a non-deterministic approach instead of a deterministic one. It is based on realism where actual role of structure, process and stage in development of landforms is focussed, rather than assigning a deterministic role to any one of them. Sometimes simulations are done to find out the reality, though one may question, 'how far they represent the reality. Increased recognition of the role of man (much advanced scientifically and technologically, and equipped with modern tools/machines) in alteration of geomorphic form and process is also a new trend in geomorphic approach (Thomas, 1956; Brown, 1970).

Paradigm shift in geomorphology and earth science

Most significant development in postmodern geomorphic thought and for that matter in earth science as a whole has been that of paradigm shift. When a particular paradigm in a discipline outlives its period of usefulness and is replaced by another one, it can be termed as 'paradigm shift' and that is considered a revolution in that discipline (Kuhn, 1962). This definitely governs the way of looking at things, and that provides a framework for study of a subject. It is also equated with 'super-model' within which other models are set.

The most prominent paradigm shift in geomorphology was experienced when the then existing paradigm — *cycle of erosion* was replaced. In fact, c*atastrophism* can be considered as the earliest paradigm in

geomorphology, which was followed by *uniformitarianism* and *stratigraphic correlation* by fossils in the 19th Century. Hart (1986) opined that *uniformitarianism* was so deep and comprehensive concept that it was more than a paradigm; rather it was a 'super-paradigm' and it was not replaced by the Davisian *cycle of erosion*. Hence this cannot be considered as a paradigm shift. The *cycle of erosion* is the first paradigm in geomorphology, which was replaced by *plate tectonics* paradigm in 1967. The revolution brought by it is reflected in the title of the book by Hallam (1973) — *A Revolution in the Earth Sciences: from Continental Drift to Plate Tectonics*.

Among other milestones in geomorphic approach, mention may be made of Chorley's interrelated *model-based* approach and *systems analysis* under the general systems theory to deal with the problem of evolution of landforms (Chorley and Haggett, 1967 and Chorley and Kennedy, 1971). Both were presented by the authors as paradigms, but failed to stand as one, for the lack of greater applicability and complete acceptance (Hart, 1986). However, both the approaches have widened the horizon of geomorphic enquiry and analysis.

Conclusion

Whatever praise or criticism is there for the postmodern movement typified by deconstruction and scepticism to established modern thought, it cannot be denied that this has stirred a hot debate in philosophy, arts and social sciences. Deconstruction or scepticism should result into emergence of new ideas that would help in finding the truth behind any human or social phenomena, and in physical phenomena/system as well. This is because many old ideas are still valuable to a discipline, and in fact, in the spiral growth of knowledge they are undoubtedly relevant. For example, in geomorphology the dictum that landforms are function of structure, process and stage, put forward by Davis, and the concept of *uniformitarianism*, propounded by Hutton, still holds good, and will remain so, as long as landscape evolution will be studied in the world. It is surprising, that the term postmodernism has not been referred in geomorphological context at all. The author failed to find even a single paper on it. Whatever happened in post 1950s has been referred to as 'recent trends' in geomorphology, and it should be taken as a continuum of the modern thought. No doubt, the post 1950s phase has been revolutionary in many respects. Detailed scientific researches, new views on dynamic evolution of landforms, new tools and technologies for field and laboratory works and emergence of sharp and critical methodologies have not only rejuvenated geomorphic research and approach but taken it to a level at par with other geosciences. Despite innumerable valuable contributions by the geologists towards the development and growth of geomorphology, the geologists in the USA have now given up their claim over geomorphology. That does not mean it is an orphan now. Without doubt, the discipline of geomorphology can flourish in the fold of geographers since they are capable to give new directions to geomorphology, emanating from new geographic perspective, approach, tools and techniques. The first and foremost geographic perspective is analysis of spatial distribution and spatial arrangement of landforms in a regional and global scale. The second is association and interrelationship among the different geoforms as they are part of a system. The third one is related with detection, monitoring and prediction of changes in landforms and processes and relationship between them over time and space. The forth one is identification, distinction and classification of landforms which owes its origin to endogentic or exogentic processes. It is important to know the role played by each

process in shaping the landform and building a complex landscape. With the help of these perspectives, the geographers can carry on study of landforms and the processes sculpturing them over time and space, and can make significant contribution to geomorphology.

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